

# Dark Decades in Particle Physics and Cosmology

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**Abstract:** Mathematics is the Heaven of physics but at the same time can often be a hell that leads astray. Here we present a list of the twelve most illogical ideas in particle physics and cosmology accepted by the scientific community. One of the items on the list is the Higgs mechanism. We show that in fact the Higgs mechanism does not explain the origin of the gravitating masses or gravitational fields. The Higgs mechanism is a mathematical hocus-pocus because it does not refer to physical phenomena. The superluminal quantum entanglement causes that in reality quantum physics is classical and statistical. Observers claim that the Uncertainty Principle is valid because detectors can not see the superluminal exchanges. What's more, the detectors see a statistical picture of a large number of consecutive states that are often the same states. Speed of photons in "vacuum" is invariant/the-same only in relation to the systems with which the photons are entangled.

## **A list of most illogical ideas in particle physics and cosmology accepted by the scientific community:**

### **1. Non-superluminal quantum entanglement is illogical**

*Definition:* Quantum entanglement is non-local.

*Illegality in reasoning:* Non-locality cannot be explained via locality.

*Simpler explanation:* Objects which do not produce volumetric fields in their surroundings, i.e. some non-gravitating physical objects (we call them imaginary objects), can move with superluminal velocity – such objects are beyond the Special Theory of Relativity.

Superluminal quantum entanglement causes that quantum physics is classical and statistical. In reality, there can not be a system that is in different states at the same time. We observe systems that are simultaneously in different states because the observation period of the system can not be shorter than  $T = L/c$ , where  $L$  is size of the system and  $c$  is the speed of light in "vacuum" whereas the quantum entanglement is superluminal so there is the illusion that the successive states exist simultaneously. We can see that quantum physics is a perverted description of the Nature seen by detectors because, unlike Nature, they do not register superluminal exchanges. The Uncertainty Principle is the illusion because it is seen by observers only.

Minds do not act in a quantum way described by the illusory quantum physics. Minds consist of solitons (they are built of the entangled Einstein-spacetime components [1]). Theory of minds is classical (it is because of the superluminal quantum entanglement) and statistical.

## 2. Propagation of pure/massless energy without physical volume is illogical

*Definition:* There is valid the Principle of Equivalence (PoE). On the other hand, photons are gravitationally massless. It suggests that pure energy can propagate without physical volumes i.e. without inertial mass.

*Illegality in reasoning:* Rotational energy of what? Pure energy such as, for example, rotational energy cannot propagate without at least imaginary physical volume.

*Simpler explanation:* There are in existence imaginary objects i.e. objects which have inertial mass (i.e. physical volume) but which do not create gravitational fields – such objects are beyond the General Theory of Relativity (GR). They can carry rotational energy. The Scale-Symmetric Theory (SST) shows that photons and gluons are the rotational energies of single or entangled spin-1 neutrino-antineutrino pairs [1] – such pairs do not violate the PoE.

## 3. Massless/pure energy cannot directly transform into gravitational mass

In reality, pure energy is carried by bare physical volumes or gravitating objects. Pure energy (the volume is not an attribute of pure energy) cannot directly transform into physical-volume/mass. SST shows that rotating neutrinos and rotating carriers of photons and gluons create discs in the Einstein spacetime (ES) composed of the gravitating neutrino-antineutrino pairs. In such discs, number density of the pairs is a little higher than the mean of ES so it is difficult to detect it. There is obligatory the Einstein formula  $E = Mc^2$ , where  $E$  is the rotational energy and  $M$  is gravitational mass of the disc [2], [3]. Absorption of a photon causes that there is absorbed the massive disc as well. It is the reason that absorption of a photon by a system increases its mass. The increase in mass is not due to a direct transformation of rotational energy into mass.

## 4. Higgs mechanism

It is assumed that observed mass of massless gauge bosons is the result of their interactions with the Higgs field. The Higgs field is the scalar field because particle mass does not depend on direction of motion. SST shows that in reality the SST Higgs field consists of the pure physical volumes with infinitesimal spin – the infinitesimal spin leads to the matter-antimatter asymmetry [4]. It is the reason that within the mainstream Higgs mechanism we cannot solve the matter-antimatter asymmetry.

*Definition:*

A) We say that some fields (which can be localized into different particles) couple to the Higgs field but we do not say what physical phenomena are responsible for such coupling.

B) We say that after a process called spontaneous symmetry breaking, the Higgs field is separated into two parts i.e. into a dynamic field (the Higgs bosons are the excited states of such field) and a constant called the vacuum expectation value (VEV). There is the word “spontaneous” but there must be some phenomena responsible for creation of the Mexican-hat potentials the spontaneous symmetry breaking was possible. Moreover, there is the real Higgs field (i.e. gravitating) and imaginary Higgs field (i.e. non-gravitating) so we should answer following question: What processes fix a point on the plane defined by the real axis and perpendicular to it the imaginary axis? Notice that the strength of the gravitational and electromagnetic field decreases monotonically with the increasing distance, of the nuclear strong field increases (SST shows that it is untrue [1]), whereas the Mexican-hat potential shows that strength of the Higgs field initially decreases and then increases. We can see that

behaviour of the Higgs field is even stranger than the nuclear strong field – it suggests that probably distances of pairs are fixed not because of the Mexican-hat potentials.

C) Due to the spontaneous symmetry breaking, there appears a VEV, which is defined by some number  $V$ , and a new dynamical field. The  $g$  called the coupling constant, which is a number, determines how strong the interaction is between, for example, the electron-positron pair and the Higgs field. It is assumed that the combination  $m = gV$  is the mass of both the electron and positron. We can see that stronger interaction with Higgs field causes that particle acquires higher rest mass. But Higgs mechanism does not describe physics of the combination  $gV$ .

D) The masses acquired due to the Higgs mechanism do not create a clear order. So what are phenomena responsible for such disorder?

*Illegality in reasoning:* The real problems are defined within the Scale-Symmetric Theory (SST) and are as follows. What is the spontaneous symmetry breaking for the inflation field, i.e. how the non-gravitating inflation field transformed into the elementary gravitating objects? Next, what phenomena lead to the Mexican-hat potentials around the elementary gravitating objects (or to some analogue) to create associations of them i.e. to create the electrically charged leptons and all hadrons?

We can define problems to be solved using other words. Initially there was the non-gravitating inflation field composed of pure physical volumes. What phenomena transformed it into the residual inflation field (we call it the SST non-gravitating Higgs field) and the gravitating neutrino-antineutrino pairs all electrically charged leptons and all hadrons are built of? And next, what phenomena cause that the gravitating neutrino-antineutrino pairs produce the Mexican-hat potentials or leading to similar effects? Why do we need to collide particles to fix the distances between the neutrino-antineutrino pairs to create particles (it concerns the Higgs boson with a mass of 125 GeV as well)?

We can define also the problems via following questions. What is the origin of gravitational constant and what phenomena lead to the minima for the short-distance quantum entanglement and confinement of the gravitating neutrino-antineutrino pairs?

*Simpler explanation:* It is fully described within the Scale-Symmetric Theory [5], [1]. Most important are the phase transitions of the non-gravitating inflation field. The spinning and having internal helicity binary systems of closed strings (they are composed of the non-gravitating pure physical volumes) the neutrino-antineutrino pairs consist of create vortices in the SST non-gravitating Higgs field. The circumferences of such vortices fix the distances between the binary systems of closed strings. Moreover, there must be satisfied some symmetries and selection rules to create the very stable neutrinos and pairs of them. Due to the internal helicity of the neutrino components and dynamic viscosity which is responsible for interactions of the components of the SST Higgs field with the binary systems of closed strings, the neutrinos produce gradients in the SST Higgs field i.e. produce gravitational fields. Such mechanism leads from the initial conditions to the theoretical value of the gravitational constant which is consistent with experimental data.

The binary systems of neutrinos create vortices composed of the binary systems of closed strings. Their circumference fixes distance between the neutrino-antineutrino pairs. It and additional selection rules lead to the electrically charged fermions.

## 5. Oscillations of neutrinos?

*Definition:* A neutrino (electron-neutrino, muon-neutrino, or tau-neutrino) can spontaneously transform into another one, and so on.

*Illegality in reasoning:* Why an electrically charged lepton (electron, muon, or tau) cannot spontaneously transform into another one, and so on?

*Simpler explanation:* The “oscillation of neutrinos” is the replacing neutrinos with others because of collisions of neutrinos with neutrinos in the Cosmic Neutrino Background, with the neutrino-antineutrino pairs the Einstein spacetime and all hadrons consist of but most important are collisions with cores of baryons because in them number density of the neutrino-antineutrino pairs is highest so probability of collision with a neutrino is highest as well – it leads to the PMNS neutrino-mixing matrix in SST [6]. Notice that in regions of the early Universe in which we can neglect production of the tau neutrinos, the sum of masses of cosmic neutrinos with different species should be 0.115 eV instead 0.287 eV [6]. In regions with dominating electron antineutrinos, because of the beta decays of neutrons on, for example, surfaces of neutron stars, the sum should be close to 0.057 eV.

## 6. Renormalization

*Definition:*  $\infty - \infty = C \neq 0$ , where  $C$  is a constant.

*Illegality in reasoning:* The  $\infty - \infty$  is a mathematical indeterminate form so physical theory containing it is incoherent.

*Simpler explanation:* Assume that bare particle has non-zero volume. Then we get rid of particles with infinite and very high energies because they would be created in the volume occupied by the bare particle. Of course, in such model we must decipher internal structure of bare particles.

## 7. Physical objects (such as, for example, electric charge) as mathematical points?

*Definition:* Mathematical point has size equal to zero.

*Illegality in reasoning:* Nothingness cannot be physical.

*Simpler explanation:* Electric charge must have size and internal structure.

## 8. Nucleons as three relativistic valence quarks?

*Definition:* Proton consists of two relativistic up quarks, one relativistic down quark, virtual quark-antiquark pairs, and gluons. In neutron, instead one up quark there is the second down quark. It means that in nucleons are three valence quarks.

*Illegality in reasoning:* No one so free/single fractional electric charge. There is the nucleon spin crisis also. Assume that someone will be able to show that the 3-valence-quarks model leads to the half-integral spin, magnetic moment and experimental mass of proton. Then, it is impossible to obtain the half-integral spin, magnetic moment and experimental mass of neutron applying the same methods and model.

*Simpler explanation:* It was found in experiments with a polarized proton target and muon beam that the number of quarks with spin in the proton’s spin direction was practically the same as the number of quarks whose spin was in the opposite direction. It is inconsistent with the 3-valence-quarks model. We can solve this problem assuming that nucleons consist of a spin-1/2 core and circular orbit with the azimuthal quantum number equal to zero. The vast majority of muons were scattered on the relativistic charged pions whose centres of mass were on the circular orbits (one charged pion per one circular orbit). What should be behaviour of relativistic charged pion on circular orbit to obtain the mean angular momentum equal to zero i.e. the  $S$  state? The Scale-Symmetric Theory shows that such pion has unitary angular momentum [1]. To obtain  $S$  state, the pion must disappear in one place of the circular orbit and appear in another, and so on. What’s more, the direction of circulation around the core of nucleons should change in a random way after subsequent jumps. It leads to conclusion that in a simplified form, we can write the changes in the angular momentum of the pion as follows:  $+1 + (-1) = 0$ . But the  $\pm 1$  causes that the experimental result should not depend on direction of polarization of the proton target in relation to the polarization of the

muon beam. SST shows that the circular orbits are perpendicular to the nucleon spin. The circular  $S$  state leads to an illusion that the number of quarks with spin in the proton's spin direction is almost the same as the number of quarks whose spin is in the opposite direction. Moreover, such model of nucleons, i.e. the core and relativistic pion in the  $S$  state, leads to masses of nucleons, their spins and magnetic moments consistent with experimental data [1].

### **9. Big Bang in nothingness is illogical**

To obtain negative gravitational potential energy, we need the superluminal pure physical volumes so total mass/energy of the Universe is positive. It means that nothingness cannot lead to observed particles. Pure physical volumes must be eternal – they protect Nature from singularities such as, for example, black holes which are the products of GR which is the incomplete theory.

### **10. The attempts to unify the Standard-Model interactions with gravity are illogical**

The gravitational interaction concerns the non-gravitating (imaginary), superluminal and metric SST Higgs field whereas the Standard-Model interactions concern the Einstein spacetime which is gravitating (real), dynamical, practically flat and its components (i.e. the neutrino-antineutrino pairs) are moving with the speed of light in “vacuum”. In SST, it is obvious that unification within the same methods is impossible but we can partially unify all interactions via the phase transitions of the inflation field – there is formula which ties them all [1].

### **11. Gravitational wave propagating with speed $c$ is a science fiction [7]**

The Higgs mechanism described within SST shows that gravitational fields do not consist of the neutrino-antineutrino pairs which are moving with the speed of light in “vacuum”  $c$ . The gravitational fields consist of the non-gravitating pure physical volumes which are superluminal. The discovered “gravitational waves” are the flows in the field composed of the neutrino-antineutrino pairs which is the flat part of the two-component spacetime. The flat part is not associated with the Ricci tensor and the metric in GR.

### **12. Constancy of speed of photons in “vacuum” simultaneously in relation to all inertial reference systems is illogical**

Logically it is impossible. It can be only because of an illusion that results from quantum phenomena. Speed of photons in “vacuum” is invariant/the-same only in relation to the systems with which the photons are entangled.

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